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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/735,826	12/13/2000	Lary R. Larson	P-8003	4912

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EXAMINER

UMEZ ERONINI, LYNETTE T

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 01/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/735,826

Applicant(s)

LARSON, LARY R.

Examiner

Lynette T. Umez-Eronini

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11/24/3.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 26-50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 36-46 is/are allowed.
- 6) ☒ Claim(s) 26-35 and 47-50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group II in Paper No. 11/24/2003 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 26 and 33-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Gnadinger (US 5,229,647).

Gnadinger teaches a method of forming a stackable wafer. The method comprises using two wafers. The following describes the use of one wafer.

forming an opening (vertical through-holes **21**) through the wafer (column 3, lines 41-43); and

extending metal bumps (conductive material) **20** through the wafers **10** by vertical through-holes (column 3, lines 39-42), which read on depositing conductive material within the opening to substantially fill the opening.

Figure 4 shows bump **20** on the upper surface of the wafer adjacent to the conductive material and a pad **22** (same as applicant's contact pad) on the lower surface of the wafer adjacent the conductive material.

Since Gnadinger uses the same step and materials as those of the claimed invention, then it would be inherent that using Gnadinger's method would result in forming a stackable wafer in an implantable device.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 27-29, 31, and 32 and rejected under 35 U.S.C. 103(a) as being unpatentable over Gnadinger ('647) as applied to claim 26 above, and further in view of Akram (US 5,808,360).

Gnadinger differs in failing to teach depositing conductive material within the opening further comprises depositing at least one of copper, tungsten, nickel, and aluminum with the opening.

Akram teaches filling opening with suitable metals include copper, nickel, gold and palladium (column 4, lines 59-60) and an interconnect can provide a permanent electrical connection in the fabrication of electronic devices (column 2, lines 58-61).

It would have been obvious to one having ordinary skill in the art the time of the claimed invention to modify Gnadinger's conductive material by using a suitable metal, for example, copper and nickel as taught by Akram for the purpose of providing a permanent electrical connection in the fabrication of electronic devices (Akram, column 2, lines 58-61).

6. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gnadinger ('647) as applied to claim 26 above, in further view of Armacost et al. (US 5,545,581).

Gnadinger differs in failing to teach removing a portion of the layer of conductive material further comprises performing a chemical mechanical polishing of the layer of conductive material to remove a portion of the layer of conductive material overlying the upper surface of the wafer.

Armacost teaches removing excess metal by using chemical polishing (column 6, lines 55-60).

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Gnadinger by employing chemical mechanical polishing to remove a conductive layer as taught by Armacost for the purpose of removing excess metal (Armacost, column 6, lines 58-60).

7. Claims 47-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hubbard (US 6,051,887) in view of Akram (US 5,808,360).

As pertaining to claim 47, Hubbard teaches a method for forming a stackable wafer for use in an implantable medical device (column 1, lines 6-9). The method comprises:

"The semiconductor stacked device **38** may be encapsulated with encapsulation material **41**, such as commercially available silicone or epoxy to form an encapsulated stacked device **50** (column 12, lines 47-50), which reads on,

providing housing;

"an implantable medical apparatus having at least one semiconductor stacked device according to the present invention therein, e.g., a stacked memory device; a first and second mounting substrate each having a semiconductor die associated therewith stacked using a plurality of substantially columnar solder connections; mounting substrates for the first and second semiconductor die including a first mounting substrate which has conductive traces for electrical connection to die bond pads of a first semiconductor die and a second mounting substrate which includes conductive vias there through" (column 3, lines 38-48), ". . . the electronic features and operations of the implantable medical device may be implemented in discrete logic or as a microcomputer-based system" column 5, lines 61-64), and " . . . the semiconductor stacked device according to the present invention may be a stacked micro controller die and memory die or processor die and memory die. Further, the semiconductor stacked device may be two stacked memory die such as with chip select addressing" (column 6, lines 5-10). Hence the above reads on,

mounting a semiconductor module inside the housing, wherein said semiconductor module includes first and second semiconductor die in a stacked arrangement, the stacked semiconductor die having circuitry implementing an operational implantable medical function.

The method further comprises, "the semiconductor die **52** includes die bond pads **92** for use in electrically connecting the circuits of the die externally to other elements, circuits, etc." (column 7, lines 54-57), which reads on,
providing a plurality of electrical connections extending between the die.

Hubbard further teaches, "... the case where implanted medical device **12** is a pacemaker implanted in body **10**, the pacemaker **12** includes at least one or both of pacing and sensing leads represented generally as leads **14** to sense electrical signals attendant to the depolarization and repolarization of the heart **16**." and "input/output circuit **24** may include any other number of circuits in addition to the controller **32** such as necessary for accomplishing the function of the implantable medical device **20**. Hence, the aforementioned reads on,

wherein delivery of electrical stimulation therapy is performed via and circuitry, **in claim 49**; and

wherein pacing and sensing function are implemented by the circuitry, **as in 50**.

Hubbard differs in failing to teach each electrical connection comprising an interconnection between a bump on an upper surface of the first die and a contact pad on a lower surface of the second die, **in claim 47**.

Akram illustrates the interaction between microbump (same as applicant bump) **30** (or **30A**) and bond pads (same as applicant's contact pad) **38** on the die **36** and further teaches permanent electrical connection of the microbump **30** (or **30A**) and bond pad **38** (column 6, lines 21-29) and improving the method for forming a microbump interconnect comprising a substrate with conductor and low resistance microbumps formed thereon using semiconductor circuit fabrication techniques (column 1, lines 63-67).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Hubbard by using Akram's method of positioning and coupling the bump of the first wafer with the contact pad of the second wafer for the purpose of improving the method for forming a microbump interconnect comprising a substrate with conductor and low resistance microbumps formed thereon using semiconductor circuit fabrication techniques (Akram, column 1, lines 63-67).

Hubbard also differs in failing to teach a solder connection is provided for the interconnection between a bump on an upper surface of the first die and a contact pad on a lower surface of the second die, **in claim 48**.

Akram teaches filling opening with suitable metals (same as applicant's solder) include copper, nickel, gold and palladium (column 4, lines 59-60) and an interconnect can provide a permanent electrical connection (same as applicant's interconnection between a bump and contact pad) in the fabrication of electronic devices (column 2,

lines 58-61), which reads on providing a solder connection for the interconnection between a bump on an upper surface of the first die and a contact pad on a lower surface of the second die.

It is the examiner's position that it would have been obvious to one having ordinary skill in the art the time of the claimed invention to modify Hubbard's conductive material by using a suitable metal, for example, copper and nickel as taught by Akram for the purpose of providing a permanent electrical connection in the fabrication of electronic devices (Akram, column 2, lines 58-61).

Allowable Subject Matter

8. Claims 36-46 are allowed.
9. The following is an examiner's statement of reasons for allowance: No prior teaches or suggests a method of forming a stacked arrangement of a first and second wafer in an implantable device using the steps that are recited in claim 36 and in combination with the limitations of claims 37-46.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465.

Lynette T. Umez-Eronini

ltue
January 9, 2004